

REMARKS

Claims 1, 2, 4, 7, 8, and 10-17 are pending in the application. Independent claims 1, 4, 7, and 15-17 have been amended by the present amendment. Also, claim 10 has been amended to provide proper claim dependency, and claims 5, 6, and 9 have been canceled without prejudice. Moreover, various typographical errors have been corrected in the claims. The amendments are fully supported by the application as originally filed.

As amended, independent claims 1, 7, 15, and 17 recite a vertical alignment mode liquid crystal display apparatus including: "at least one volume excluding member provided on only one side edge of one or more of said at least one electrode on one or both of said substrates, such that an opposite side edge of said one or more at least one electrode is without said at least one volume excluding member" (see, e.g., claim 1).

Support for the amendments is provided in the specification, e.g., on page 39, line 24 to page 40, line 1; page 40, lines 19-24; and page 41, lines 4-16. For example, referring to FIGS. 1A and 1B of the application, a protrusion 114 is provided along **only one side edge** of each electrode 103 (see specification at page 39, line 24 to page 40, line 1).

Therefore, independent claims 1, 7, 15, and 17 each require the at least one volume excluding member to be provided on only one side edge of the electrode, where an opposite side edge is **without** the volume excluding member. Applicants' claimed invention can provide significant advantages, such as a simple structure as compared to prior art structures, the ability to control tilting direction by providing the protrusion on only one side edge of each electrode, the ability to maintain a vertical alignment, and the prevention of tilting in opposite directions (see, e.g., specification at page 39, line 13 to page 40, line 14).

As amended, independent claims 4 and 16 recite a vertical alignment mode liquid crystal display apparatus including: a liquid crystal layer that "includes at least one pixel portion and a non-pixel portion, the at least one pixel portion corresponding to the at least one electrode; at

least one non-conductive window portion provided within each of the at least one electrode on the at least one of the pair of substrates, the at least one window portion dividing each of the at least one pixel portion into four or more subpixel regions; and a plurality of volume excluding members that is provided on one or more of said at least one electrode on at least one of the pair of substrates, each volume excluding member of the plurality of volume excluding members being disposed on four or more different subpixel side edges within each of the at least one pixel portion, such that the plurality of volume excluding members on each electrode do not oppose each other" (see, e.g., claim 4).

Support for the amendments is provided in the specification, e.g., on page 43, line 12 to page 44, line 19. For example, in FIG. 5, a window portion 517 is provided within each pixel electrode 503, "such that the window portion 517 divides one pixel in four or more subpixel regions," and a protrusion 514 is provided along one side edge of each subpixel region (see specification at page 43, lines 12-19). The protrusions or concave stepped portions 514 preferably are provided "on four different subpixel side edges within each pixel" (see page 43, lines 19-21). Also, as disclosed on page 22, lines 4-7: "the liquid crystal layer includes at least one pixel portion and a non-pixel portion, the at least one pixel portion corresponding to the at least one electrode." Further, as shown in FIGS. 4A and 4B, protrusions 414 are provided along "portions of two opposite side edges of each pixel in such a manner that the protrusions 414 ... do not oppose each other, thereby preventing LC molecules 415 moving in opposite directions from colliding with each other in the central portion of each pixel" (see page 42, lines 16-23).

Therefore, independent claim 4 and 16 each require at least one window portion that divides each pixel portion into four or more subpixel regions, and volume excluding members disposed on four or more different subpixel side edges within each pixel portion, such that the volume excluding members on each electrode do not oppose each other. The amendments provide significant advantages, e.g., as described on page 56, line 17 to page 57, line 8.

Claims 1, 2, 4-6, 15, and 16 were rejected under 35 USC 103(a) as being unpatentable over U.S. Patent 5,872,611 to Hirata et al. ("Hirata") in view of U.S. Patent 6,256,080 to Colgan

et al. ("Colgan"). Claims 7-14 and 17 were rejected under 35 USC 103(a) as being unpatentable over Hirata in view of Colgan, and further in view of U.S. Patent 6,313,898 to Numano et al. ("Numano"). Claims 1, 2, 4-6, 15, and 16 were rejected under 35 USC 103(a) as being unpatentable over Colgan in view of Hirata. Claims 7-14 and 17 were rejected under 35 USC 103(a) as being unpatentable over Colgan in view of Hirata, and further in view of Numano. These rejections are respectfully traversed.

Regarding the rejections of independent claims 1, 7, 15, and 17, the Hirata reference (whether taken alone or in combination with the Colgan or Numano references) does not teach or suggest a liquid crystal display apparatus in which at least one volume excluding member is provided on only one side edge of the electrode, where an opposite side edge is **without** the volume excluding member.

In Hirata, the insulating film 47 is depicted in FIG. 26 on **both** sides of the pixel electrode 44.

For at least the reasons discussed above, the proposed combinations involving the Hirata reference do not render obvious the Applicants' claimed invention as recited in independent claims 1, 7, 15, and 17, and claims depending therefrom are allowable for the same reasons.

Regarding the rejections of independent claims 4 and 16, the Hirata reference (whether taken alone or in combination with the Colgan or Numano references) does not teach or suggest a liquid crystal display apparatus in which the volume excluding members are disposed on four or more different subpixel side edges within each pixel portion, such that the plurality of volume excluding members on each electrode do not oppose each other.

Referring to FIG. 26 of Hirata, the dotted lines correspond to "slit-like openings" in the counter electrode 45 (see column 19, lines 30-34). However, Hirata does not teach or suggest volume excluding members provided on four or more different subpixel side edges within each pixel portion.

Regarding the subject matter of claim 6 (now incorporated into claims 4 and 16), FIG. 25 of Hirata was cited for allegedly teaching slit-like openings "formed in at least one electrode on the at least one of the pair of substrates" (see Office Action of 12/15/2005 at page 7, last paragraph).

However, Hirata does not teach or suggest at least one non-conductive window portion that divides each pixel portion into four or more subpixel regions and volume excluding members provided on four or more different subpixel side edges within each pixel portion, as recited in independent claims 4 and 16. Instead, Hirata teaches that a light blocking film may be required to prevent disclination (see, e.g., column 19, lines 40-45). In other words, the structure disclosed in Hirata is subject to disclination, thus requiring an additional layer (i.e., the light blocking film layer).

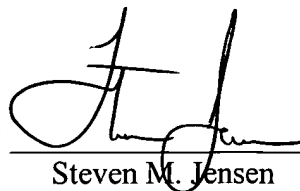
For at least the reasons discussed above, the proposed combinations involving the Hirata reference do not render obvious the Applicants' claimed invention as recited in independent claims 4 and 16, and claims depending therefrom are allowable for the same reasons.

It is believed the application is in condition for immediate allowance, which action is earnestly solicited.

Respectfully submitted,

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